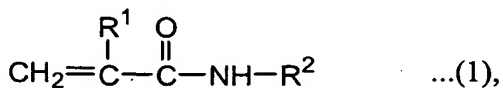


## WHAT IS CLAIMED IS:

1. A phosphorus-acid-group-containing (meth)acrylamide obtained by introducing a phosphorus acid group into a (meth)acrylamide monomer represented by the following formula (1):

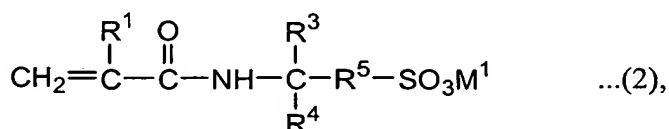


wherein  $\text{R}^1$  is a hydrogen group or a methyl group, and  $\text{R}^2$  is a hydrogen group or a substituted or unsubstituted hydrocarbon group.

2. The phosphorus-acid-group-containing (meth)acrylamide according to claim 1, wherein said phosphorus acid group is added to the amide group of said (meth)acrylamide monomer.

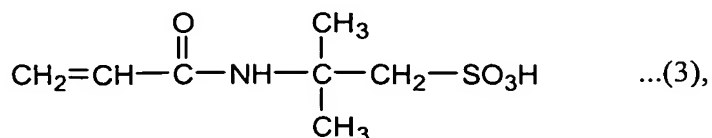
3. The phosphorus-acid-group-containing (meth)acrylamide according to claim 1 or 2, wherein said phosphorus acid group is a phosphonic or polyphosphonic group.

4. The phosphorus-acid-group-containing (meth)acrylamide according to any one of claims 1-3, wherein said (meth)acrylamide monomer is at least one selected from the group consisting of acrylamide, methacrylamide, and acrylamide alkane sulfonate represented by the following formula (2):



wherein  $\text{R}^1$  is a hydrogen group or a methyl group,  $\text{R}^3$  and  $\text{R}^4$  are a hydrogen group or an alkyl group having 1-3 carbon atoms,  $\text{R}^5$  is an alkylene group having 1-3 carbon atoms, and  $\text{M}^1$  is a hydrogen group, a metal or a tertiary-amine group.

5. The phosphorus-acid-group-containing (meth)acrylamide according to claim 4, wherein said acrylamide alkane sulfonate is t-butyl acrylamide sulfonic acid represented by the following formula (3):



6. A polymer obtained by polymerizing at least the phosphoric-group-containing (meth)acrylamide recited in any one of claims 1-5.

7. The phosphorus-acid-group-containing (meth)acrylamide polymer according to claim 6, containing another unsaturated compound as a comonomer.

8. The phosphorus-acid-group-containing (meth)acrylamide polymer according to claim 7, wherein said another unsaturated compound is (a) an unsaturated compound containing one or more ethylenically unsaturated bonds and one or more acid groups in a molecule, and/or (b) an unsaturated compound containing one or more ethylenically unsaturated bonds but no acid group in a molecule; said acid-group-containing, unsaturated compound having at least one acid group selected from the group consisting of a phosphoric group, a sulfonic group, a carboxylic group and an alcoholic hydroxyl group; and said unsaturated compound with no acid group being at least one selected from the group consisting of (meth)acrylonitrile, (meth)acrylamide, (meth)acrylate,

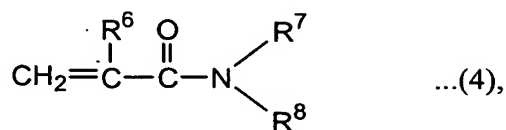
alkyl-amino-group-containing, unsaturated monomers, liquid oligomers of conjugated dienes and their derivatives, liquid oligomers of vinyl aromatics and conjugated dienes and their derivatives, substituted or unsubstituted styrenes, vinyl halides, aliphatic acid vinyl esters, and fluoro-group-containing, unsaturated monomers.

9. The phosphorus-acid-group-containing (meth)acrylamide polymer according to claim 8, wherein said alcoholic-hydroxyl-group-containing, unsaturated compound is phosphatized.

10. The phosphorus-acid-group-containing (meth)acrylamide polymer according to any one of claims 7-9, wherein said another unsaturated compound is a cross-linking agent having two or more ethylenically unsaturated bonds in a molecule.

11. The phosphorus-acid-group-containing (meth)acrylamide polymer according to any one of claims 8-10, wherein said alkyl-amino-group-containing, unsaturated monomer is an N,N-dialkyl (meth)acrylamide represented by the

following formula (4):



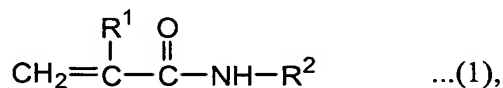
wherein  $\text{R}^6$  is a hydrogen group or a methyl group, and  $\text{R}^7$  and  $\text{R}^8$  are independently alkyl groups.

12. A conductive resin comprising the phosphorus-acid-group-containing (meth)acrylamide polymer recited in any one of claims 6-11 as an indispensable component.

13. The conductive resin according to claim 12, comprising at least one selected from the group consisting of unsaturated alcohol copolymers comprising an unsaturated alcohol unit and a vinyl halide unit and/or an aliphatic acid vinyl ester unit, partially acetalized unsaturated alcohol polymers, melamine resins, poly(meth)acrylonitrile, poly(meth)acrylate, polyacrylamide, poly(meth)acrylic acid, polyacetal, urethane resins, cellulose or its modified products, polystyrene, polyvinyl chloride, and polyvinyl acetate.

14. A coating agent comprising the conductive resin recited in claim 12 or 13 in the form of a solution.

15. A polymer electrolyte membrane produced by polymerizing phosphorus-acid-group-containing (meth)acrylamide, which is obtained by introducing a phosphorus acid group into at least a (meth)acrylamide monomer represented by the following formula (1):



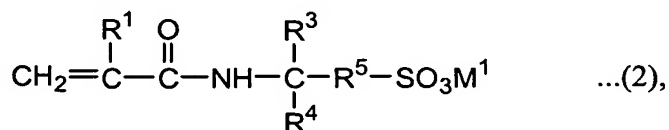
wherein  $\text{R}^1$  is a hydrogen group or a methyl group, and  $\text{R}^2$  is a hydrogen group or a substituted or unsubstituted hydrocarbon group.

16. The polymer electrolyte membrane according to claim 15, wherein said phosphorus acid group is added to the amide group of said phosphorus acid group (meth)acrylamide.

17. The polymer electrolyte membrane according to claim 15 or 16, wherein

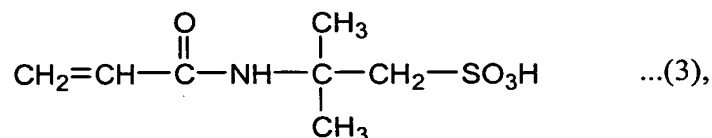
said phosphorus acid group is a phosphonic or polyphosphonic group.

18. The polymer electrolyte membrane according to any one of claims 15-17, wherein said (meth)acrylamide monomer is at least one selected from the group consisting of acrylamide, methacrylamide, and acrylamide alkane sulfonate represented by the following formula (2):



wherein  $\text{R}^1$  is a hydrogen group or a methyl group,  $\text{R}^3$  and  $\text{R}^4$  are a hydrogen group or an alkyl group having 1-3 carbon atoms,  $\text{R}^5$  is an alkylene group having 1-3 carbon atoms,  $\text{M}^1$  is a hydrogen group, a metal or a tertiary-amine group.

19. The polymer electrolyte membrane according to claim 18, wherein said acrylamide alkane sulfonate is t-butyl acrylamide sulfonic acid represented by the following formula (3):



20. The polymer electrolyte membrane according to any one of claims 15-19, further comprising another unsaturated compound as a comonomer.

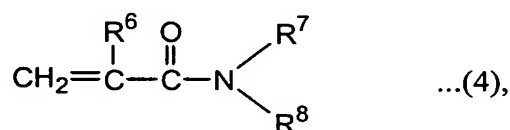
21. The polymer electrolyte membrane according to claim 20, wherein said another unsaturated compound is (a) an unsaturated compound containing one or more ethylenically unsaturated bonds and one or more acid groups in a molecule and/or (b) an unsaturated compound containing one or more ethylenically unsaturated bonds but no acid group in a molecule; said acid-group-containing, unsaturated compound having at least one acid group selected from the group consisting of a phosphoric group, a sulfonic group, a carboxylic group and an alcoholic hydroxyl group; and said unsaturated compound with no acid group being at least one selected from the group consisting of (meth)acrylonitrile, (meth)acrylamide, (meth)acrylate, alkyl-amino-group-containing, unsaturated monomers, liquid oligomers of conjugated dienes and their derivatives, liquid

oligomers of vinyl aromatics and conjugated dienes and their derivatives, substituted or unsubstituted styrenes, vinyl halides, aliphatic acid vinyl esters, and fluoro-group-containing, unsaturated monomers.

22. The polymer electrolyte membrane according to claim 21, wherein said  
5 alcoholic-hydroxyl-group-containing, unsaturated compound is phosphatized.

23. The polymer electrolyte membrane according to any one of claims 20-22, wherein said another unsaturated compound is a cross-linking agent having two or more ethylenically unsaturated bonds in a molecule.

24. The polymer electrolyte membrane according to any one of claims 21-23,  
10 wherein said alkyl-amino-group-containing, unsaturated monomer is N,N-dialkyl (meth)acrylamide represented by the following formula (4):

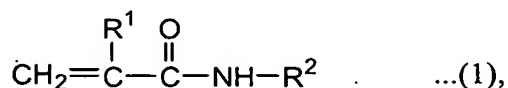


wherein  $\text{R}^6$  is a hydrogen group or a methyl group, and  $\text{R}^7$  and  $\text{R}^8$  are independently alkyl groups.

15 25. The polymer electrolyte membrane according to any one of claims 15-24, comprising at least one selected from the group consisting of unsaturated alcohol copolymers comprising an unsaturated alcohol unit and a vinyl halide unit and/or an aliphatic acid vinyl ester unit, partially acetalized unsaturated alcohol polymers, melamine resins, poly(meth)acrylonitrile, poly(meth)acrylate, polyacrylamide,  
20 poly(meth)acrylic acid, polyacetal, urethane resins, cellulose or its modified products, polystyrene, polyvinyl chloride, and polyvinyl acetate.

26. A fuel cell using the polymer electrolyte membrane recited in any one of claims 15-25.

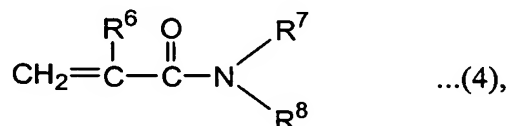
27. A method for producing phosphorus-acid-group-containing  
25 (meth)acrylamide, comprising (a) reacting a (meth)acrylamide monomer represented by the following formula (1):



wherein  $R^1$  is a hydrogen group or a methyl group, and  $R^2$  is a hydrogen group or a substituted or unsubstituted hydrocarbon group, with phosphoric anhydride and/or phosphorus oxychloride, and hydrolyzing the resultant product, or (b) reacting said (meth)acrylamide monomer with at least one selected from the group consisting of phosphoric acid, pyrophosphoric acid and polyphosphoric acid, in a solvent containing no active hydrogen and/or an acidic solvent.

28. The method for producing phosphorus-acid-group-containing (meth)acrylamide according to claim 27, wherein said solvent containing no active hydrogen is at least one selected from the group consisting of N,N-dialkyl

(meth)acrylamide represented by the following formula (4):

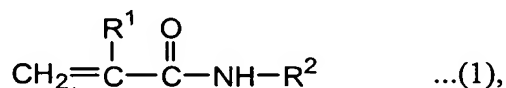


wherein  $R^6$  is a hydrogen group or a methyl group, and  $R^7$  and  $R^8$  are independently alkyl groups, dimethylformamide, N,N-dimethylacetamide, and dimethyl sulfoxide.

29. The method for producing phosphorus-acid-group-containing (meth)acrylamide according to claim 28, wherein said N,N-dialkyl (meth)acrylamide is N,N-dimethyl (meth)acrylamide.

30. A method for producing a phosphorus-acid-group-containing (meth)acrylamide polymer, comprising the steps of (1) (a) reacting a

(meth)acrylamide monomer represented by the following formula (1):

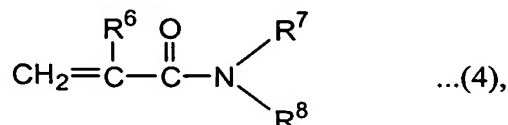


wherein  $R^1$  is a hydrogen group or a methyl group, and  $R^2$  is a hydrogen group or a substituted or unsubstituted hydrocarbon group, with phosphoric anhydride and/or phosphorus oxychloride, and hydrolyzing the resultant product, or (b) reacting said (meth)acrylamide monomer with at least one selected from the group consisting of phosphoric acid, pyrophosphoric acid and polyphosphoric acid, in a solvent containing no active hydrogen and/or an acidic solvent, to prepare

phosphorus-acid-group-containing (meth)acrylamide, and (2) polymerizing at least the resultant phosphorus-acid-group-containing (meth)acrylamide.

31. The method for producing a phosphorus-acid-group-containing (meth)acrylamide polymer according to claim 30, wherein said

- 5 phosphorus-acid-group-containing (meth)acrylamide is prepared using N,N-dialkyl (meth)acrylamide represented by the following formula (4):



wherein R<sup>6</sup> is a hydrogen group or a methyl group, and R<sup>7</sup> and R<sup>8</sup> are independently alkyl groups, as said solvent containing no active hydrogen, and  
 10 wherein the resultant reaction solution is used to copolymerize said N,N-dialkyl (meth)acrylamide and said phosphorus-acid-group-containing (meth)acrylamide.

32. The method for producing a phosphorus-acid-group-containing (meth)acrylamide polymer according to claim 31, wherein said N,N-dialkyl (meth)acrylamide is N,N-dimethyl (meth)acrylamide.

- 15 33. The method for producing a phosphorus-acid-group-containing (meth)acrylamide polymer according to any one of claims 30-32, wherein a composition comprising at least said phosphorus-acid-group-containing (meth)acrylamide and a release agent is prepared, and the resultant composition is radiation-polymerized in a state where it is sandwiched by two supporting  
 20 substrates.